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STRATEGY RESEARCH PROJECT

COUNTERING THE BIOLOGICAL WEAPONS THREAT TO THE HOMELAND

BY

LIEUTENANT COLONEL PERRY E. BARTH United States Army

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Countering the Biological Weapons Threat to the Homeland

by

Lieutenant Colonel Perry E. Barth
United States Army

Robert C. Coon, COL(RET)

Project Advisor

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U.S. Army War College
CARLISLE BARRACKS, PENNSYLVANIA 17013

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ABSTRACT

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Lieutenant Colonel Perry E. Barth

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The United States is ill prepared and naïve to the possibilities and consequences of the threat of an attack against the homeland by a biological weapon of mass destruction (WMD). Due to the vast amount of information regarding the development and employment of these weapons, the technical and scientific challenges to creating these weapons no longer exist. Biological warfare is the deliberate spreading of disease among humans, animals, and plants. Biological warfare agents include both living microorganisms (bacteria, protozoa, rickettsia, viruses, and fungi), and toxins (chemicals) produced by microorganisms, plants, or animals. Biological agents have been used as weapons of war for thousands of years. Many nations and terrorists groups now have the capability to attack the homeland with a biological weapon. Current defense measures for WMD do not adequately address the unique problems in countering the biological threat. Efforts must be made to increase our intelligence gathering capabilities and to develop broad-spectrum anti-bacterial and anti-viral compounds capable of protecting against a wide range of pathogens. While the United States may never be able to prevent an attack by a persistent terrorist or belligerent state, we can significantly reduce the likelihood of an attack and the resulting effects.

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COUNTERING THE BIOLOGICAL WEAPONS THREAT TO THE HOMELAND

Following the collapse of the Soviet Union the United States breathed a sigh of relief thinking, albeit falsely, that the threat of an attack to our homeland by a weapon of mass destruction (WMD) had been averted forever. Our obsession with the Soviet nuclear threat throughout the cold war left us ill prepared and naive to the possibilities and consequences of another threat with the capability to unleash death in massive proportions; the threat of a biological weapon of mass destruction.

This paper will focus on the emerging threat the United States faces from a biological weapon attack against our homeland and the current strategy for countering the threat. The author will suggest additional countermeasures to deal with the threat.

The potential for biological weapons use is on the rise, partly because the technical and scientific barriers to creating biological weapons no longer exist. The explosion of information regarding these weapons and the expansion of biotechnology for legitimate purposes are two factors making biological weapons more available.¹

The National Defense University says that germ weapons could well become an enemy's "weapon of choice" because: 1) very small quantities can kill very large numbers of people; 2) advanced delivery systems are not required; 3) biological weapons can be readily acquired; and 4) biological warfare programs are relatively easy to conceal. Moreover, humans, animals, and plants are all vulnerable to a germ warfare attack.²

Anyone interested in developing a biological weapon can readily obtain the information and the raw materials needed to successfully produce a weapon. Contributing to this problem is the rapid growth in the industrial and biotechnology sectors across the globe. The same materials and technology used in developing cures for disease can also be used to produce a weapon, making enforcement of treaties and restricting access to material and production equipment difficult.

Concern about U.S. vulnerability to WMD attacks became acute in 1995 following television broadcasts showing people dashing up Tokyo subway stairs, gagging, covering their mouths with handkerchiefs as they fled the chemical nerve agent sarin that had been unleashed by Aum Shinrikyo, an apocalyptic religious sect. Concern heightened; if it could happen in Tokyo, it could happen here.

Following the Aum Shinrikyo attack, President Clinton issued Presidential Decision Directive 39, detailing U.S. counter-terrorism strategy. In addition to reducing vulnerabilities and working to prevent and deter terrorist acts before they occur, the policy directs the federal government to manage the consequences of terrorist attacks.

BIOLOGICAL WARFARE DEFINED

Biological warfare can be defined as the deliberate spreading of disease among humans, animals, and plants.³ Biological warfare agents include both living microorganisms (bacteria, protozoa, rickettsia, viruses, and fungi), and toxins (chemicals) produced by microorganisms, plants, or animals. Diseases are caused when ample amounts of harmful living microorganism enter into the target group.

Some pathogens may simply cause death, while others may also be communicable, in which case the initial contamination and resulting casualties could simply be the precursor to a far more serious problem.

Living organisms require incubation periods of 24 hours to six weeks between infection and appearance of symptoms. Although this incubation period places limits on their battlefield utility, this same delay in the onset of symptoms allows a terrorist group to disperse and vanish before authorities realize an attack has occurred. This delayed incubation period could cause the attack, if covert, to be confused with a natural outbreak of disease. This also means that biological weapons can continue to have a significant impact many weeks after the initial attack, in other words a pandemic.

Toxins are generally more lethal, acting relatively quickly causing incapacitation or death within minutes or hours. While some experts classify toxins as chemical rather than biological agents, most do not. Additionally, toxins were included within the 1972 Biological Weapons Convention as reflected in its formal title, the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction.

Biological agents are odorless, tasteless, and when dispersed in an aerosol cloud, are small enough to be invisible to the human eye. Weight-for-weight, biological weapons are hundreds to thousands of times more potent than the most lethal chemical weapon, meaning that even small amounts (e.g., a few kilograms) could be used with devastating effect.⁴

HISTORICAL USAGE

The use of biological agents as weapons for waging war has been around for thousands of years. Some of the most notable examples are listed below.

Two of the earliest reported uses occurred in the 6th century BC, with the Assyrians poisoning enemy wells with rye ergot, and Solon's use of the purgative herb hellebore during the siege of Krissa. In 1346, plague broke out in the Tartar army during its siege of Kaffa (at present day Feodosia in Crimea). The attackers hurled the corpses of those who died over the city walls; the plague epidemic that followed forced the defenders to surrender, and some infected people who left Kaffa may have started the Black Death pandemic which spread throughout Europe. Russian troops may have used the same plague-infected corpse tactic against Sweden in 1710.⁵

Smallpox has also been used on numerous occasions as a biological weapon. Two historical examples are presented below.

Pizarro is said to have presented South American natives with variola-contaminated clothing in the 15th century, and the English did the same when Sir Jeffery Amherst provided Indians loyal to the French with smallpox-laden blankets during the French and Indian War of 1754 to 1767. Native Americans defending Fort Carillon sustained epidemic casualties, which directly contributed to the loss of the fort to the English.⁶

THE BIOLOGICAL WEAPONS THREAT - WHAT CAN WE EXPECT?

THE AGENTS

Listed at Table 1 are the most likely agents to be used in a biological weapon. Inhalation anthrax, brucellosis, glanders, pneumonic plague, tularemia, and Q fever are caused by bacteria. The viral diseases listed are smallpox, Venezuelan equine encephalitis, and the viral hemorrhagic fevers. Toxins listed include botulinum toxin, ricin, and mycotoxins.⁷

Disease	Transmit Man to Man	Effective Dose (Aerosol)	Incubation Period	Lethality	Vaccine Efficacy (aerosol exposure)
Inhalation anthrax	No	8,000-50,000 spores	1-6 days	High	2 dose efficacy against 200- 500 LD ₅₀ (Note 1) in monkeys
Brucellosis	No	10 -100 organisms	5-60 days (usually 1-2 months)	<5% untreated	No vaccine
Glanders	Low	Assumed low	10-14 days via aerosol	> 50%	No vaccine
Pneumonic Plague	High	100-500 organisms	2-3 days	High unless treated within 12-24 hours	3 doses not protective against 118 LD₅₀ in monkeys
Tularemia	No	10-50 organisms	2-10 days (average 3-5)	Moderate if untreated	80% protection against 1-10 LD ₅₀
Q Fever	Rare	1-10 organisms	10-40 days	Very low	94% protection against 3,500 LD ₅₀ in guinea pigs
Smallpox	High	Assumed low (10-100 organisms)	7-17 days (average 12)	High to moderate	Vaccine protects against large doses in primates
Venezuelan Equine Encephalitis	Low	10-100 organisms	2-6 days	Low	TC 83 protects against 30- 500 LD ₅₀ in hamsters
Viral Hemorrhagic Fevers	Moderate	1-10 organisms	4-21 days	High for Zaire strain, moderate with Sudan	No vaccine
Botulism	No	0.001 μ g/kg (Note 2) is LD ₅₀ for type A	1-5 days	High without respiratory support	3 dose efficacy 100% against 25-250 LD ₅₀ in primates
Staph Enterotoxin B	No	0.03 μ g/person incapacitation	3-12 hours after inhalation	< 1%	No vaccine
Ricin	No	3-5 μ g/kg is LD ₅₀ in mice	18-24 hours	High	No vaccine
T-2 Mycotoxins	No	Moderate	2-4 hours	Moderate	No vaccine

Note 1: LD₅₀ is the lethal dose that will kill 50 percent of the exposed population. In this example, 2 doses of vaccine provided protection against 200-500 lethal doses of anthrax inhaled.

Note 2: μ g/kg = micrograms/kilogram.

TABLE 1 – CHARACTERISTICS OF THE MOST LIKELY BIOLOGICAL WARFARE AGENTS⁸

Biological weapons can be produced from widely available pathogens that may be procured for legitimate biomedical research or obtained from soil or infected animals and humans. Moreover, many of the infectious diseases associated with biological warfare are endemic to most of the states suspected of developing a biological weapons capability. Biological agents are both cheap and easy to obtain. Any nation with a basic pharmaceutical industry has a de facto capability to produce biological weapons.

THE ACTORS AND THEIR MOTIVATIONS

To accurately access the potential threat of a biological weapons attack against the homeland, one must look at the actors and their motivation to use a biological weapon against the United States. The threat facing the United States can be divided into two categories; nations and terrorists groups.

In 1972, the United States and many other countries endorsed the Biological Weapons Convention (BWC). This treaty prohibits the stockpiling of biological agents for offensive military purposes, and also forbids research into such offensive employment of biological agents. The former Soviet Union and the government of Iraq were both signatories to this accord. However, despite this historic agreement among nations, biological warfare research continued to flourish in many countries hostile to the United States. In fact, the Senate Permanent Subcommittee on Investigations in late 1995 identified fifteen countries believed to possess biological weapons: Libya, China, North Korea, South Korea, Iraq, Taiwan, Syria, Israel, Iran, Egypt, Vietnam, Laos, India, South Africa, and Russia. The list has likely expanded, as Russian scientists migrate to other nations for employment.

The best example of a nation violating the provisions of the BWC is the extensive program developed by the Soviet Union. Biopreparat, the civilian arm of the Soviet Union's biological weapons program, comprised over half of the entire program's personnel and facilities. Ken Alibek, First Deputy Director of Biopreparat from 1988 until his defection to the U.S. in 1992, sheds some insight on the subject in his book "Biohazard".

Over a twenty-year period that began, ironically, with Moscow's endorsement of the Biological Weapon's Convention in 1972, the Soviet Union built the largest and most advanced biological warfare establishment in the world. We were among the 140 signatories of the convention, pledging "not to develop, produce, stockpile or otherwise acquire or retain" biological agents for offensive military purposes. At the same time, through our covert programs, we stockpiled hundreds of tons of anthrax and dozens of tons of plague and smallpox near Moscow and other Russian cities for use against the United States and its Western allies. ¹¹

Additionally, the government of Iraq admitted to be actively involved in the development and weaponization of biological agents. Following the Gulf War, the United Nations inspection teams conducted their first inspection of Iraq's biological warfare capabilities in August of 1991. On August 2, 1991, representatives of the Iraqi government announced to leaders of United Nations Special Commission Team 7 that they had conducted research into the offensive use of *Bacillus anthracis*, botulinum toxins, and *Clostridium perfringens* (presumably one of its toxins). This was the first open admission of biological weapons research by any country in recent years, and it verified many of the

concerns of the U.S. intelligence community. Iraq had extensive and redundant research facilities at Salman Pak and other sites, many of which were destroyed during the war.

In 1995, further information on Iraq's offensive program was made available to United Nations inspectors. Iraq conducted research and development work on anthrax, botulinum toxins, *Clostridium perfringens*, aflatoxins, wheat cover smut, and ricin. Field trials were conducted with *Bacillus subtilis* (a simulant for anthrax), botulinum toxin, and aflatoxin. Biological agents were tested in various delivery systems, including rockets, aerial bombs, and spray tanks. In December 1990, the Iraqis filled 100 R400 bombs with botulinum toxin, 50 with anthrax, and 16 with aflatoxin. In addition, 13 Al Hussein (SCUD) warheads were filled with botulinum toxin, 10 with anthrax, and 2 with aflatoxin. These weapons were deployed in January 1991 to four locations. All in all, Iraq produced 19,000 liters of concentrated botulinum toxin (nearly 10,000 liters filled into munitions), 8,500 liters of concentrated anthrax (6,500 liters filled into munitions) and 2,200 liters of aflatoxin (1,580 liters filled into munitions).

Terrorists groups make up the second category of actors that pose a threat to the homeland. Generally speaking, the modern terrorist can be categorized into one of four groups; state-sponsored, nationalistic/ethnic, anti-government, and non-state ideological. The importance in making these distinctions lies in the objectives and motivations of each group and the resulting propensity to use a biological weapon to achieve their goals.

The first group to consider is the state-sponsored terrorist. State-sponsored terrorists are terrorists completely or partially under the control of national governments, used as weapons against the enemies of such governments. For instance, North Korea has sponsored terrorist groups primarily to operate against South Korea. Iraq tried unsuccessfully to use agents to conduct acts of terrorism against the United States during the Gulf War. Of the four groups, the state-sponsored terrorist has the greatest capability to create and use a biological weapon. Theoretically, these groups have the resources of the state behind them. They also have clear targets to act against; the enemies of the state. However, the supporting state may deter the terrorists use of a WMD for fear of retaliation against the state. If a state-sponsored group used a biological weapon against the United States, immediate and drastic retaliation would be expected. States may also be reluctant to provide biological weapons or related technology support to terrorists for fear of loosing control of the weapons.

The nationalistic/ethnic terrorist can be defined as a group attempting to achieve self-determination against the wishes of the government in power. This is perhaps the most common form of terrorism today; examples include Basque activities in Spain, IRA activities in Northern Ireland, and Palestinian actions in the Middle East. Conceivably it could include the activities of white supremacists in the United States seeking to achieve some sort of "white homeland." This group would have less to fear in terms of retaliation because most governments are less likely to retaliate against their own citizens than against another nation. However, the benefit of using a biological weapon for this group would be doubtful. These groups try to manipulate the emotions of the larger population, demoralizing them in an effort to give in to the terrorist demands. The use of a biological weapon might be too extreme, enraging the general population, resulting in a massive retaliation against the terrorist group.

Anti-government terrorism could be considered "revolutionary" terrorism, in that it consists of acts directed against ruling governments by people unhappy with such governments. These groups may wish to replace the government, but do not wish to separate themselves from the nation it governs. The actions of Timothy McVeigh might are a good recent example of this form of terrorism. The choice of a biological weapon to achieve an objective would be doubtful because of the potential for wide-scale, unintended effects. These terrorists prefer to target specific icons of government. Destruction is more important than generating casualties. The group would not likely win converts to the "cause" because of the horrific nature of the casualties.

The non-state ideological groups consist of terrorists which commit acts of terrorism in the pursuit of some broad ideology or theology, rather than for a specific nationalistic or ethnic goal. Such terrorists tend to be international in nature, committing a wide variety of acts in a number of different geographical areas. Many of the left-wing international terrorists of the 1970s might fit into this category; so too might some of the radical animal rights groups active since the 1980s. Because such terrorists can sometimes adopt nationalistic causes or accept sponsorship from nation-states, they sometimes blend into the other categories. 16 These groups are the most likely to use a biological weapon because they are not strongly connected to one particular nation, and have little fear of retaliation. They tend to seek broad, ideological goals, not discriminating too closely between attacking governments and attacking populations. Fanatical in their beliefs, these groups seek approval for their acts, not from the general public, but from their members and supporters. These terrorists may be motivated by financial gain, personal revenge, or even the perceived hand of God. The Aum Shinrikyo group responsible for the sarin attack in Japan was this type of group. Terrorist groups sponsored by Usama bin Laden, the wealthy Saudi exile based in Afghanistan, could also be placed in this category. These groups may seek to inflict heavy civilian casualties as a method to punish the U.S. for what they see as our government's hegemonic policies in the Middle East.

Analyzing the current trends in international terrorism leads one to the conclusion that the threat from biological weapons terrorism is on the rise. This conclusion is based on several factors; the increasing availability of technology; the decline of traditional, politically motivated terrorist groups and the rise of groups driven by extreme ideologies; and the willingness to kill large groups of people to advance their goals or to project their strength.¹⁷

WEAPONIZATION AND DELIVERY SYSTEMS

The most challenging aspect of using biological weapons is developing a system to deliver the agent to the target in a form that will cause a significant incidence of disease. For a biological agent to be effective, it must enter the body by some pathway. Several routes of exposure are possible, but the most important and most dangerous is through aerosol inhalation. Aerosols with a particle size in the one to five micrometer (microns) range are the most effective. Their small size allows them to stay suspended in the air in the form of a cloud, maximizing the opportunity for exposure. Particles larger than five microns

have a tendency to fall to the ground. If inhaled, most of these larger particles are filtered by the respiratory system. Those that do reach the lungs may not migrate deep enough into the lungs to have the desired effects. Particles smaller than one micron are so small that they are exhaled before they can attach to tissue.

Other routes of exposure are possible, but much less effective than inhalation. Such routes include oral ingestion by contamination of food or water and percutaneous penetration through open skin, mucous membranes or through the eyes.

Four components are necessary to successfully weaponize an agent. The first and most important component is the agent. For an agent to be effective, it must be delivered in a quantity adequate to service the intended target, it must be stable from the time of production, through delivery, dissemination and after release, and it must be in a size and form conducive to the intended route of exposure.

Biological agents can be delivered in either liquid or dry form. The procedures and equipment used for preparing liquid biological agents are simple, but the resulting product is difficult to disseminate into small-particle aerosols. Conversely, the procedures for producing dried biological agents are complex and require more sophisticated equipment; however, the product is readily disseminated by any number of crude devices.¹⁸

The second component in the process of weaponization is developing a workable munition. For example, actors attempting to use ballistic missiles must successfully develop warheads and possibly bomblets to make this type of point source weapon effective. Bomblets or spray mechanisms could be used with cruise missiles or aircraft to produce a line-source weapon.

The third component required is a reliable delivery system. Actors resorting to the use of ballistic or cruise missiles will face significant technical challenges in this area. The high stresses, gravitational forces and heat generated by the acceleration and re-entry of ballistic missiles makes them a less-than-ideal method of delivering live biological agents. Considerable technical efforts are required to package live biological agents in a missile warhead and ensure that the agent is dispersed at the correct height and angle of delivery. The Soviets were able to meet these challenges in the 1970's. They successfully developed single-warhead intercontinental ballistic missiles for use in delivery of biological weapons. ¹⁹ Iraq's program to deliver biological weapons via missile is another example. Recent UN revelations that Iraq may have retained 16 ballistic missiles armed with biological warheads in violation of UN Resolutions underlines the serious potential threat posed by ballistic missiles armed with biological warfare agents. ²⁰

Mounting an aerosol dispersal system on an Unmanned Aerial Vehicle (UAV) or cruise missile, creating, in effect, a remotely piloted crop duster, would be an effective way of deploying biological agents over a target area. The U.S. experimented with and actually built a working aerosol delivery system in the 1960s. A recent CIA report on Iraq's pre-1991 WMD program emphasized that such methods of biological weapons delivery are increasingly seen as practical. Iraq worked to adapt a modified aircraft drop tank for biological agent spray operations beginning in December 1990. The tank could be attached either to a piloted fighter or to a remotely piloted aircraft that would be guided to the target by another,

piloted aircraft. The tank was designed to spray up to 2,000 liters of anthrax on a target. 21

Along the same lines, the Japanese Aum Shinrikyo Cult is reported to have planned to produce enough agent to annihilate a large Japanese city by spraying it with chemical or biological agents from a helicopter. The Cult also possessed a Russian helicopter and two radio-controlled drone aircraft that, with modifications, could have been capable of delivering chemical and biological weapons.²²

Aerosols may be also be delivered by much simpler technology. Terrorists may be content to use an explosive system or other crude spraying devices such as a fire extinguisher filled with agent and discharged into the air intake system of a large building. Industrial sprayers with nozzles modified to generate the smaller particle size can dispense the particles over large areas. The aerosols could be delivered from a line source such as an airplane or boat traveling upwind of the intended target, or from a point source such as a stationary sprayer or a missile dispensing agent-containing bomblets in an area upwind of the target.²³

The last component of an effective biological weapons attack on an "open-air" target is the weather conditions at the target site. Unlike chemical weapons, biological agents are not as controllable or predictable in their effects and are even more dependent than chemical agents upon temperature, weather, and topographical conditions. For an aerosol cloud to be maximally effective, it must remain approximately 3 to 15 feet above ground. An inversion, a weather condition in which a cold layer of air is trapped near the surface beneath a warm layer of air, represents an ideal environment in which to disseminate an aerosol. Under these conditions, the cold air prevents the vertical mixing of air and the aerosol remains at ground level.²⁴ An inversion is most likely to occur between sundown and daybreak.

Wind is also an important factor in an open-air attack. Aerosols are most effective in wind speeds between 5 and 25 mph.²⁵ In calm conditions, the coverage of the aerosol will be limited. Winds in excess of 25 mph will have a tendency to disperse the aerosol cloud, reducing its effectiveness.

Liquid and dry agents can be disseminated effectively over a wide range of environments: subfreezing temperatures, hot tropical conditions, dry desert conditions and even during moderate rain and snowfall. As a general rule, liquid agents perform best in humid environments. Dry agents perform best in dry environments.

POTENTIAL TARGETS

The preferred targets for a biological weapons attack will depend primarily on the type of attacker. With maximum casualties the likely goal, metropolitan areas are the most at risk. A hostile nation in time of war would be inclined to attack large population centers, militarily significant targets such as airports and seaports used for military mobilization, and centers of government. Contaminating a major port would slow the military mobilization process, significantly affecting our ability to rapidly project our national military power. A nation attacking our center of government could have a destabilizing effect on command and control of military forces and the nation in general.

Terrorists, on the other hand, may be satisfied to attack concentrations of people such as stadiums, large office buildings, and subways. Aerosolized agents could be released upwind from any large population area. Canisters filled with a biological agent and fitted with a timing device could be placed within enclosed areas or in the heating and air conditioning systems in buildings. Agents could be used to contaminate bulk food supplies in restaurants, supermarkets, of food processing plants. Water supplies may also be a potential target for an attack. Contaminating large water supplies such as city water supplies might not be very effective due to the large amount of agent required and water purification procedures used by most cities in the United States. However, contaminating the water supply at the point that it enters a building could be effective.

A hostile nation could use the threat of a biological weapon attack as a means of influencing national policy. In their 1998 strategic assessment, the National Defense University listed WMD as the most dangerous of the asymmetric treats likely to emerge in the next 10 years "because they can erode U.S. ability, will, and credibility to project power to protect national interests and international security." China, for instance, could notify the United States of its intent to take military action against Taiwan and hold the United States at bay with the threat of an attack against Los Angeles, San Francisco, or Seattle. With a nuclear strike as our only viable recourse to such an attack, we may be forced to sit back and watch, not wanting to risk an attack to our homeland and the inevitable escalation.

THE AFTERMATH

Presently, and for the near future, major cities in the U.S. and around the world remain indefensible to an attack by a biological weapon. Biological attacks could cause widespread panic among civilian populations. The very large number of casualties would place huge burdens on medical facilities. The relatively poor warning devices available against biological attack and the potential delayed effects of some agents make mis-identification of the agent more likely, leading to the failure of defense measures.

One study conducted in 1970 illustrated the potential of an anthrax weapon used against a civilian population center. The study estimated that fifty kilograms of aerosolized anthrax spores dispensed by a line source two kilometers upwind of a population center of 500,000 unprotected people in ideal meteorological conditions, would travel greater than 20 kilometers downwind, and kill/incapacitate up to 125,000 people in the path of the biological cloud.²⁸

In addition to their detrimental health effects on the targeted population, biological warfare agents would likely cause significant impacts on the medical care system. The extraordinary number of patients requiring intensive care would overwhelm medical resources. Special medications or vaccines not generally available in standard pharmaceutical stocks would be required. Medical care providers and laboratory personnel might need added protection, while autopsy and interment of remains could present hazards not commonly dealt with.

Complicating the immediate medical challenges is the possibility of increased feelings of helplessness and hopelessness if the immediate response and consequence management efforts appear

to be failing. Intense competition for available but limited resources could generate even more societal disruption and casualties. The belief that treatment will be provided to some but not so others will contribute to the possibility of social disruptions such as riot and panic.²⁹

Panic will be a particular risk when biological agents are used to threaten or to attack a sizable civilian population. Demoralization can also be a response to the predicaments presented by a biological attack. Demoralized individuals often lose their sense of social and group responsibilities and roles. If major community institutions fail to provide protection, citizens can lose faith in the ideological metaphors that bind the community together.³⁰

The intimidating nature of biological weapons is such that an attack or the threat of an attack is likely to cause wholesale disruption or paralysis of civil and economic activity in the affected area. The result may be a breakdown in law and order requiring curfews, crowd control, and possibly, martial law.

DEFENSE MEASURES - CURRENT APPROACHES

In light of the potential threat, the U.S. has launched an extensive program, with plans to spend billions of dollars over the next several years to counter the threat of a WMD attack. A myriad of organizations has been created at all levels of government to respond quickly to an incident. The Departments of Defense, Energy, and State, together with the FBI, and the CIA, oversee an extensive network of military and civilian agencies dedicated to identifying biological or chemical attacks and coping first with the crises and then with the consequences.

The current plans to deal with a domestic NBC incident emphasize rapid detection and identification of NBC agents and subsequent consequence management. To date, the federal government has used existing fire and emergency services plans as a foundation and focused preparedness programs on conventional first responders, firefighters and police. This strategy is well founded and provides an important base for response strategies but is incomplete. Prior to further federal program development and implementation, there needs to be a reconsideration and modification to the current approach to include health care professionals and health care facilities.³¹

While this approach may seem appropriate for a chemical or nuclear attack, where the impact of the attack is immediate, localized, and the affected area and victims are readily identified, it doesn't address the unique aspects of a biological attack. A clandestine biological weapons attack may take days or even weeks to detect. Most likely, the first indication of an attack will be patients presenting themselves at medical treatment facilities not to highly trained, protected, first response teams. The incident may first appear as a natural outbreak of a disease.

RECOMMENDATIONS

EDUCATION OF HEALTH CARE PROFESSIONALS

The Department of Health and Human Services, through the Center for Disease Control (CDC), should develop an education program for health care providers aimed at recognition and treatment of the most likely causative agents. Health care professionals must be able to recognize the signs and

symptoms of a biological attack in order for the community and nation to respond quickly and successfully. Following a known biological agent release, police and firefighters, the first responders at the scene of the incident, will initiate response and treatment protocols. However, exposed and contaminated survivors will still report to emergency rooms and health care facilities for evaluation and treatment. Health care professionals may be unaware of exposures or uninformed regarding the nature of the exposure.

INTELLIGENCE GATHERING

Additionally, CDC should develop an electronic, rapid reporting system that would require health care providers to make timely reports of disease outbreaks. An effective reporting system could detect and diagnose trends in disease outbreaks across the nation. Unfortunately, existing local, regional, state, and national surveillance systems that detect emerging infectious agents are not adequate to detect potential biowarfare agents.³²

These systems can provide a first warning of potential terrorist agents and would be useful for many other important public health issues. Sophisticated surveillance systems must be in place and must be integrated with the existing public health infrastructure, including emergency departments. A national electronic network to monitor reports of unusual medical events and medical databases from hospitals and other local sources, including emergency agencies, poison control centers, medical examiner offices, and managed care organizations, will provide real-time valid information critical to early detection and identification.³³

Our best courses of action for countering the biological threat may well be in the prevention of an attack. The recent revelations regarding Iraq's and the former Soviet Union's capabilities were a "wake-up call" for the intelligence community. Knowledge about our adversaries' intentions and capabilities lies at the very heart of our defense against this heinous type of warfare.

Internationally, the Central Intelligence Agency needs improved intelligence capabilities to track terrorist groups and rogue nations suspected of developing biological toxins and delivery vehicles, and to the extent possible, to provide warnings when these actors begin production and before they attempt to employ such biological weapons. Additionally, we should expand our cooperation with our allies in this regard, and enhance the relationship between our own intelligence and counterintelligence communities.

To address the WMD terrorist threat most effectively, we should enhance our human intelligence capability and direct our efforts toward the high-payoff areas of unofficial cover operations and clandestine intelligence collection. While the challenges associated with unofficial cover are many and realizing a pay-off may take several years, the potential benefit is the ability to have a clear understanding of a group's intent.

Nationally, intelligence capabilities need to be expanded to deal with domestic terrorism and foreign terrorism on U.S. soil. The concept behind the FBI's Joint Terrorism Task Force (JTTF) needs to be expanded to more areas across the nation, both urban and rural. The JTTF combines the resources and abilities of federal, state, and local officials to deal effectively with the threats posed to this country by

potential terrorists. While some states have effective intelligence gathering and threat assessment mechanisms, many do not. Additional resources should be directed to the state and local level so that all states and municipalities can participate effectively in detection and prevention efforts.

COUNTER-ACQUISITION

The United States should continue efforts to strengthen existing treaties and to integrate verification procedures. The main multilateral arms control regimes limiting WMD are the 1925 Geneva Protocol, the 1968 Nuclear Non-Proliferation Treaty (NPT), the 1972 Biological Weapons Convention (BWC), the 1987 Missile Technology Control Regime (MTCR), and the 1993 Chemical Weapons Convention (CWC). The BWC, which bans the development, production, stockpiling, and acquisition of biological weapons, has no verification provisions, enabling governments like Iraq and the former Soviet Union to develop offensive biological weapons programs. While the 135 countries that have accepted the BWC have, in the last few years, begun to construct confidence-building measures to enhance adherence to the treaty, these measures appear likely to be of limited effectiveness. A case of too little, too late. The U.S. must realize that regardless of the terms of the treaty, enforcement and verification will in some cases be futile. A nation that views biological weapons as a possible countermeasure to the U.S. nuclear capability will likely develop such a program, successfully hiding it under the safe umbrella of medical research.

PASSIVE PROTECTION

Additional resources should be directed to developing and stockpiling vaccines and antibiotics. Two of the most deadly and probable diseases to be encountered are anthrax and smallpox. The Department of Defense has initiated a prudent, comprehensive program to vaccinate service members against anthrax, but the feasibility of vaccinating the entire civilian population is not realistic and quite frankly, not necessary. Anthrax can be treated with antibiotics and post-exposure vaccinations can be administered successfully if treatment is given relatively quickly following exposure. The key to success is identifying the agent early. In addition, anthrax is not contagious, reducing the chance of the disease spreading beyond the initial infected population.

Smallpox, on the other hand, poses more serious problems. Smallpox is very contagious and treatment options following exposure are extremely limited. The World Health Organization declared smallpox eradicated in 1980 and we in the U.S. ceased routine vaccination against smallpox in the early 1980s. Consequently, the U.S. population is extremely vulnerable. While some vaccine is available, not enough is available to mount a major vaccination campaign. Unfortunately, the former Soviet Union worked extensively to develop more virulent strains of the virus and successfully weaponized smallpox in the late 1980s. Because financial support for laboratories in Russia has sharply declined in recent years, there are increasing concerns that existing expertise and equipment might fall into the hands of terrorists. Considering the possibility that smallpox may not be contained in the two authorized depositories, the CDC in Atlanta, Georgia and the Institute of Virus Preparation in Moscow, Russia, the World Health

Organization should reverse their position against vaccination and a comprehensive vaccination program against smallpox should be initiated worldwide.

Vaccination, while beneficial in some cases, will not be the most effective course of action in the long run. As the medical community develops effective vaccines against an agent, the likelihood that a rogue nation or terrorist will develop a resistant strain increases as advances in biotechnology continue. Consequently, efforts should be made to develop broad-spectrum anti-bacterial and anti-viral compounds capable of protecting against a wide range of pathogens. Specifically, increased resources should be funneled into research into the science of nonspecific immunity, the process by which cells and molecules responsible for coordinating the body's immune response against invaders.

Nothing will replace the long-term protection provided by vaccines against specific diseases, but boosting our nonspecific immune system may offer at least temporary protection from pathogenic agents and possibly could go even further. If administered in the crucial first hours after an attack—when authorities are still trying to identify which agent was used and organize a medical response—such a booster could help contain the crisis.³⁶

SUMMARY

The magnitude of the threat of a biological attack against the United States is unprecedented. The most effective countermeasures for such an attack are somewhat unique to the biological threat and are not effectively addressed in the current administration's "one-size-fits-all" strategy for defending against WMD. Additional emphasis and resources must be directed towards the specific countermeasures outlined above. While the United States may never be able to prevent an attack by a persistent terrorist or belligerent state, we can significantly reduce the likelihood of an attack and the resulting effects.

WORD COUNT = 5982

ENDNOTES

- ¹ Francis H. Marlo, "WMD Terrorism and US Intelligence Collection," <u>Terrorism and Political Violence</u> 11, no. 3 (Autumn 1999): 54.
- ² "Biological Weapons Proliferation: Reasons for Concern, Courses of Action," linked from <u>The Henry L. Stimson Center</u>, available from http://www.stimson.org/cwc/pubs/rpt18.htm; Internet; accessed 14 October 1999.
- ³ William E. King IV, "Biological Warfare: Are U.S. Armed Forces Ready?" The Land Warfare Papers 34 (October 1999): 3.
- ⁴ "Devil's Brews in Detail Biological Weapons," linked from <u>Centre For Defense and International Security Studies</u> at "Missiles and the Devil's Brew Documents," available from http://www.cdiss.org/bw.htm; Internet; accessed 27 February 2000.
- ⁵ Edward M. Eitzen, Jr. et al., <u>Medical Management of Biological Casualties Handbook</u> (Fort Detrick, Frederick, MD: USAMRIID, September 1999), 3.
 - ⁶ Ibid.
 - ⁷ Ibid.
 - ⁸ lbid., app H.
 - ⁹ Ibid., 6.
- ¹⁰ Congress, Senate, Committee on Governmental Affairs. Permanent Subcommittee on Investigations, Global Proliferation of Weapons of Mass Destruction. Hearing before the Permanent Subcommittee on Investigations of the Committee on Governmental Affairs, 104th Cong., 1st sess., 31 October and 1 November 1995, 309.
 - ¹¹ Ken Alibek, <u>Biohazard</u> (New York: Random House, 1998), x.
 - 12 Eitzen et al., 8.
- ¹³ Mark Pitcavage, ed., "Afraid of Bugs: Assessing Our Attitudes Toward Biological and Chemical Terrorism," 12 February 1999; available from http://www.militia-watchdog.org/anthrax.htm; Internet; accessed 27 February 2000.
 - 14 lbid.
 - 15 Ibid.
 - 16 lbid.
 - ¹⁷ Marlo, 54.
- ¹⁸ Frederick R. Sidell, William C. Patrick, III, Thomas R. Dashiell, <u>Jane's Chem-Bio Handbook</u> (Alexandria, VA.: Jane's Information Group, 1998), 230.

²⁰ Devils Brews in Detail.

²¹ Ibid.

²² Ibid.

²³ King, 11.

²⁴ Sidell, Patrick, and Dashiel, 237.

²⁵ Ibid., 238.

²⁶ lbid.

²⁷ National Defense University, <u>Strategic Assessment 1998: Engaging Power for Peace</u> (Washington, D.C.: U.S. Government Printing Office, 1998), xiv.

²⁸ Eitzen et al., 11.

²⁹ Harry C. Holloway et al., "The Threat of Biological Weapons: Prophylaxis and Mitigation of Psychological and Social Consequences," <u>Journal of American Medical Association</u> 278, no. 5 (6 August 1997): 425.

³⁰ Ibid.

³¹ Joseph F. Waeckerle, "Domestic Preparedness for Events Involving Weapons of Mass Destruction," <u>Journal of American Medical Association</u> 283, no. 2 (12 January 2000): 253.

³² Ibid.

³³ Ibid.

³⁴ "Diplomacy and Arms Control," linked from <u>Centre For Defense and International Security Studies</u> at "Missiles and the Devil's Brew – Documents," available from http://www.cdiss.org/cbwdip.htm; Internet; accessed 17 March 2000.

³⁵ Eitzen et al., 49.

³⁶ Alibek, 290.

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